Amendments to the Specification

Please replace the paragraph starting on page 12, line 23 and ending on page 13, line 20 with the following paragraph:

An exemplary embodiment of fluid ejection array element 303 of fluid ejector array 302 of the present invention, is shown, in a cross-sectional view, in Fig. 3a. In this embodiment, fluid ejector 320 and photodetector 330 are disposed on essentially optically transparent substrate 360. Photodetector 330 is disposed on front surface or fluid ejector substrate surface 361 of substrate 360. Fluid ejector 320 includes fluid energy converting element 322. Electrical interconnect 337 electrically couples photodetector 330 to fluid ejector 320 via an electrical trace (not shown) that is disposed on substrate 360 either in or out of the plane of the drawing. In this embodiment, substrate 360 is a glass substrate and may include any of the borosilicate, soda lime or quartz glasses (including crystalline and amorphous). However, in alternate embodiments, materials such as silicon oxide including silicon dioxide or silicon oxynitride, silica mixed with oxides of, for example, potassium, calcium, barium or lead, sapphire, or various polymers such as polycarbonates, polyethylene terephthalates, polystyrenes, polyimides, and polyacrylates including polymethylacrylate may also be utilized. In this embodiment, substrate 360 has sufficient transmittance in the wavelength region of photons emitted from the photon source to provide a signal to noise ratio of at least two to one. The photon source (not shown) photonically couples to photodetector 330 through substrate 360 via opposing major substrate surface 362. Semiconductor materials transmit photons with energies less than the band gap energy of the semiconductor material (i.e. all photons greater than or equal to the band gap energy are absorbed). Thus, in still other embodiments, any substrate sufficiently optically transparent in essentially the wavelength range emitted by the photon source [[340]] providing a detectable signal to noise ratio also may be utilized. For example, substrate 360 may be a silicon substrate that transmits light in the infrared region from about 1.3 microns to about 6.7 microns. In such an embodiment, the fluid dispensing system would include a photon source emitting in this wavelength region such as solid

state diodes or lasers whose active elements include GaAs, InP, $PbS_{(1-x)}Se_x$, $Pb_{(1-x)}Sn_xTe$, or $Pb_{(1-x)}Sn_xSe$.

Please replace the paragraph on page 22, line 28 and ending on page 23, line 8, with the following paragraph:

An example of an alternative structure that may be utilized for a photon focusing array [[546]] is shown in an isometric view in Fig. 6. In this example, photon collimator 646 includes body 682 formed from a material having an index of refraction n_1 and optical waveguide 683 formed from a material having an index of refraction n_2 where n_2 is greater than n_1. The photon beam is transmitted along the length of waveguide 683 by internal reflection at the step change in the refractive index maintaining the emitted photon beam from photon source 640 essentially in the central core or optical waveguide 683 with minimal loss at the surface of waveguide 683. In alternate embodiments, graded-index structures also may be utilized depending on the particular photon source utilized for the fluid dispensing system [[500]]. For example, a photon source having a particular multi-mode emission pattern may utilize a graded-index having a parabolic grading of n_2.

Please replace the paragraph on page 23, line 10 and ending on page 24, line 25, with the following paragraph:

An individual element of photon source array 547 (see Fig. 5b) as well as a photon source for other embodiments of the present invention is shown in a simplified cross-sectional view in Fig. 7a. In this embodiment, photon source array 747 is an electroluminescent array formed on photon source substrate 720 utilizing electroluminescent layer 726 as the layer in which photons are generated. Photon source array 747 includes any of the electroluminescent sources such as devices emitting light by electrofluorescence or electrophosphorescence or combinations and mixtures of both. Photon source array 747 may be driven by either an ac or dc electrical source depending on the particular material or materials used to form electroluminescent layer [[722]] 726. First electrode layer 722 is deposited or formed on photon source

substrate 720. In this embodiment, light is emitted through first electrode layer 722 and substrate 720. Substrate 720 is any material, which is substantially optically transparent in the wavelength region over which electroluminescent layer 726 emits. For example, if electroluminescent layer [[722]] 726 emits in the visible region of the electromagnetic spectrum, substrate 720 may be formed from any of the various glasses such as borosilicate, soda lime or quartz glasses (including crystalline and amorphous), or various polymers such as polycarbonates, polyesters such as polyethylene terephthalate, polystyrene, and polyacrylates such as polymethylacrylate. First electrode layer 722 may be any electrically conductive material, which is also substantially optically transparent in the wavelength region over which electroluminescent layer 726 emits. For example antimony tin oxide or indium tin oxide deposited or formed on substrate 720 may be utilized. In alternate embodiments, light may be emitted through second electrode layer 730 in which case second electrode would be formed from an appropriate optically transparent material. First dielectric layer 724 is formed on first electrode layer 722, and may be formed from any high dielectric strength material having the appropriate optical transparency for the electroluminescent material being utilized. For example, first dielectric layer 724 may be formed from silicon dioxide, aluminum oxide, polycarbonate, or polyester. Electroluminescent layer 726 is formed over first dielectric layer 724 and second dielectric layer 728 is formed over electroluminescent layer 726 followed by formation of second electrode layer 730 formed over second dielectric layer 728. In an alternate embodiment, electroluminescent layer 726 may be formed directly on first electrode layer 722 eliminating first dielectric layer 724. Second dielectric layer 728 may be formed from any of the high dielectric strength materials utilized in various electronic applications. Second electrode layer may be formed from any of the metal or organic electrical conductors utilized in various electronic applications. For example, dielectric materials include silicon dioxide, silicon nitride, silicon carbide, aluminum oxide, boron nitride, barium titanate, as well as layers formed from combinations of such materials. Electrical conductors include metals, and doped semiconductor materials. A few examples are aluminum, silver, tungsten, gold, cesium, as well as carbon and doped polysilicon or germanium. In addition, organic conductors also may be utilized such as polyaniline compounds including camphorsulfonic acid doped polyaniline, polypyrroles,

pentacenes, anthracenes, napthacenes, phenanthrenes, pyrenes, thiophene compounds, conductive ink, and similar materials.

Please replace the paragraph on page 25, line 6 and ending on page 26, line 5, with the following paragraph:

Referring to Fig. 7b, an alternate embodiment of a photon source is shown in a simplified cross-sectional isometric view. In this embodiment, the photon source includes multiple carbon nanotube photon emitters combined to form a photon source. In alternate embodiments multiple groups of carbon nanotube photon emitters are combined to form an array of photon sources. In Fig. 7b one carbon nanotube photon emitter 744, of the multiple emitters contained in the photon source, includes carbon nanotube 760 operated as a three terminal field effect transistor. Carbon nanotube 760 is in contact with silicon dioxide layer 762 formed on p+ silicon substrate 764. Source contact 765 and drain contact 768 are formed over portions of carbon nanotube 760. Carbon nanotube 760 is formed by laser ablation and deposited on silicon dioxide layer 762 via a solution of the carbon nanotubes in, for example, dichloroethane. Source contact 765 and drain contact 768 are formed from titanium deposited onto portions of carbon nanotube 760 utilizing lithography and lift-off techniques. Source contact 765 and drain contact 768 are about 50 nanometers in thickness. In alternate embodiments, other metals capable of forming metal-nanotube Schottky barriers may also be utilized as well as thicknesses in the range from 10 nanometers to about 100 nanometers. Silicon dioxide layer 762 in this embodiment is about 150 nanometers in thickness; however, in alternate embodiments thicknesses in the range from about 10 nanometers to about 200 nanometers also may be utilized. In this embodiment, a silicon dioxide layer (not shown) is also deposited over carbon nanotube 760, as well as source 765 and drain 768 contacts. In alternate embodiments other dielectric materials having the appropriate optical characteristics may also be utilized. In addition, in alternative embodiments, substrate 764 may be formed from any semiconductor material either n+ or p+ such as silicon or gallium arsenide. Substrate 764 forms gate contact 763. The band gap in carbon nanotubes is inversely proportional to the tube diameter. Carbon nanotube 760, in this embodiment has a diameter of about 1.4 nanometers, providing

photons 710 in the infrared region of the spectrum. In alternate embodiments, by varying the diameter of the carbon nanotube the wavelength output of carbon nanotube emitter 764 may be controlled.